NAVAL SUBMARINE MEDICAL RESEARCH LABORATORY

Submarine Base New London,
Groton CT 06349

Our Mission: To Protect the Health and Enhance the Performance of our War Fighters Through Focused Submarine, Diving and Surface Research Solutions

SMART: Predicting Attrition and Retention Among Enlisted Personnel in the Submarine Force

Mark N. Bing, Ph.D., Jerry Lamb, Ph.D., Alison America & Rick Severinghaus

NAVY MEDICINE
World Class Care…Anytime, Anywhere

CNO-N779

DEPARTMENT OF THE NAVY
ONR
Science & Technology

Why do we psychologically screen Submariners?

- Submarine working environment is unique.
  - No personal space and no sunlight
  - Disrupted sleep/wake cycles
  - Difficulty avoiding workplace conflicts
  - Danger from enemy targets and excessive sea pressure
- MANMED Article 15-69 para 2(i): “Because of the nature of the [submarine] duties, the psychological fitness of applicants for submarine training must be carefully appraised.”
- Naval Submarine School (NAVSUBSCOL) Instruction 6420.1: Designates the NSMRL as the command responsible for meeting MANMED requirement via SUBSCREEN program

Prediction of Suitability for Submarine Service

NAVY MEDICINE
World Class Care…Anytime, Anywhere

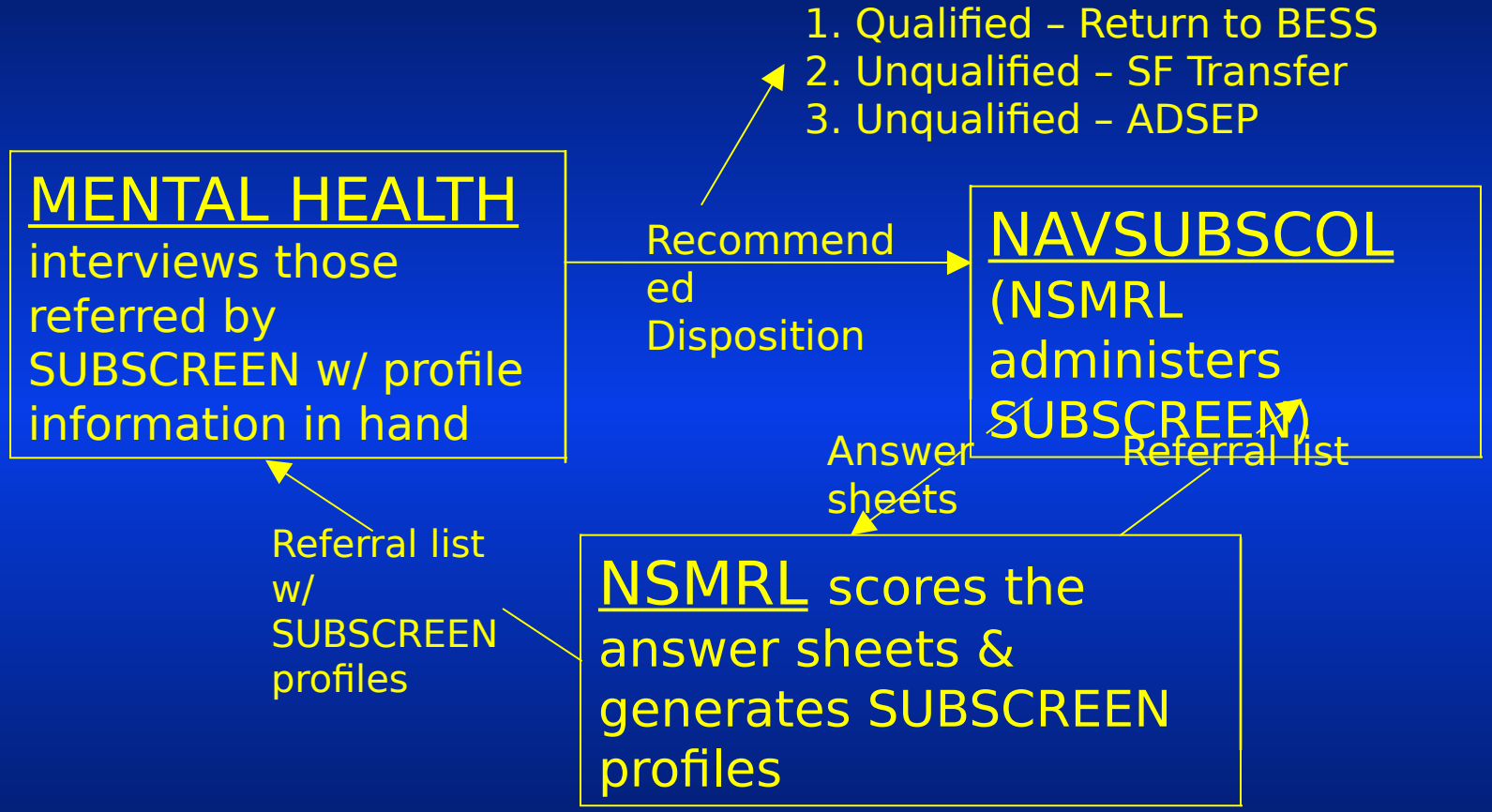
CNO-N779

DEPARTMENT OF THE NAVY
Science & Technology

SUBSCREEN Test

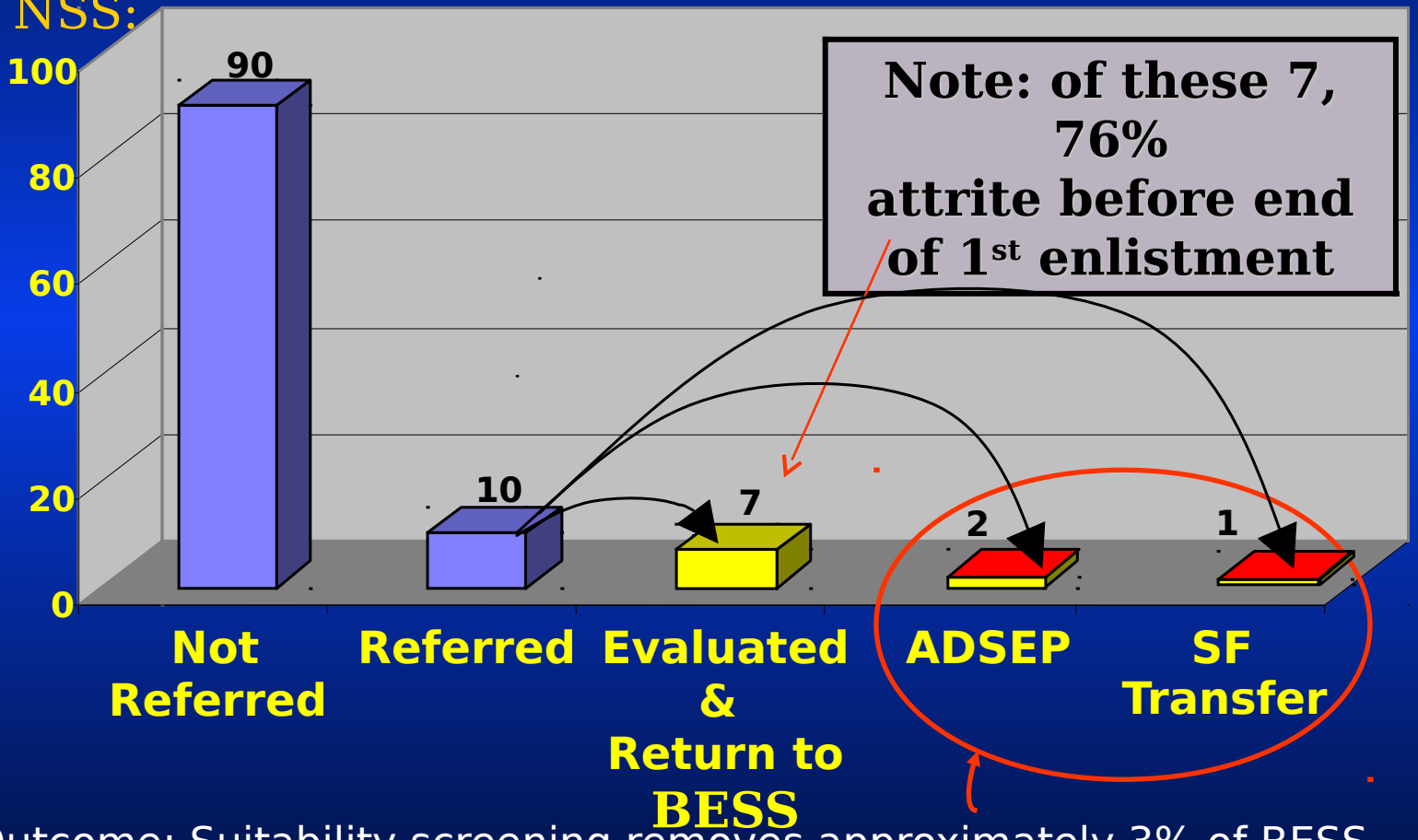
- 240-item self-report questionnaire developed in 1986
- 5 Major Dimensions
  - **Procedural** **Faking, Extreme Responding**
  - **Submarine** **Problems Submerging, Uncertain about Subs**
  - **Affective** **Depression, Anxiety**
  - **Socialization** **Aggressive-Destructive, Social Isolation**
  - **Additional** **Suicidal Ideation, Claustrophobia**
- Database norms for:
  - 30,000 enlisted
  - 4,400 officers

SUBSCREEN Process


1. Qualified – Return to BESS
2. Unqualified – SF Transfer
3. Unqualified – ADSEP
MENTAL HEALTH interviews those referred by SUBSCREEN w/ profile information in hand
Recommended Disposition
NAVSUBSCOL (NSMRL administers SUBSCREEN)
Answer sheets
Referral list
Referral list w/ SUBSCREEN profiles
NSMRL scores the answer sheets & generates SUBSCREEN profiles

Enlisted Suitability the SUBSCREEN Referral System

For every 100 sailors starting at BESS at NSS:



Outcome: Suitability screening removes approximately 3% of BESS students from the submarine training pipeline – about 75/yr.

Naval Submarine Medical Research Laboratory

Prediction of Enlisted Attrition using SMART

CNO-N779

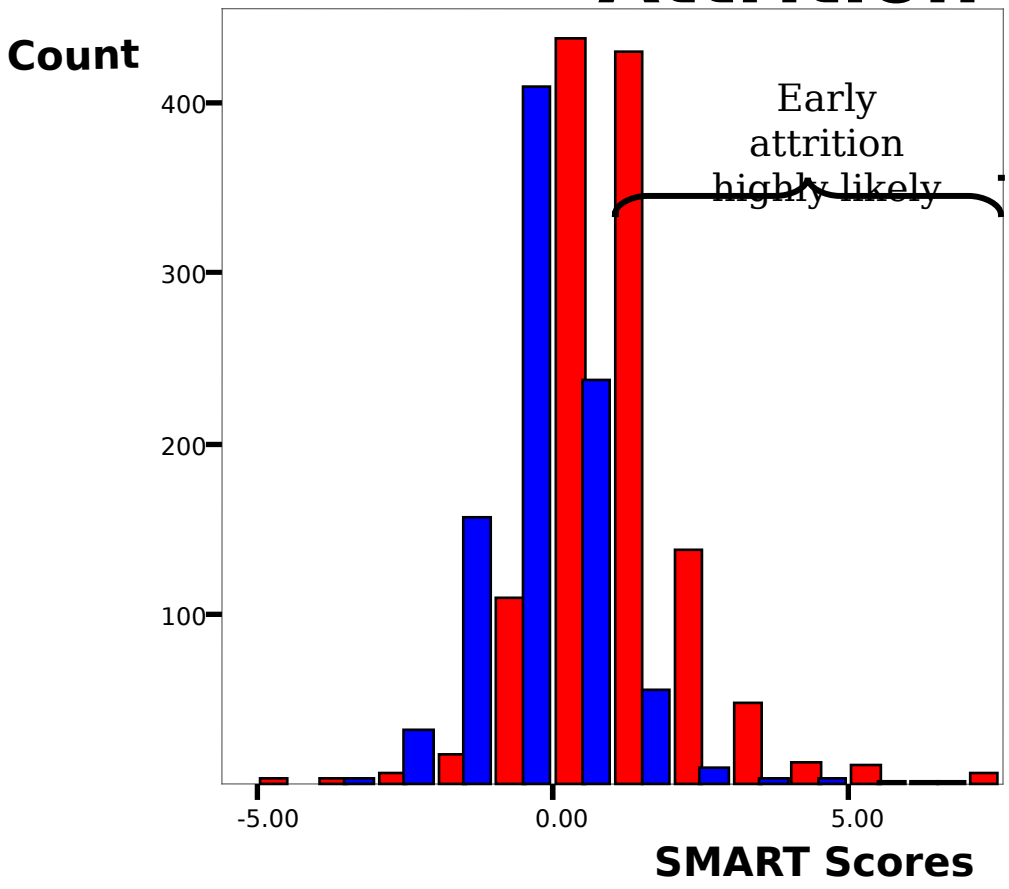
Enlisted Attrition - SubMarine Attrition Risk Test (SMART)

- SUBSCREEN database used to analyze career paths of several thousand submariners who had taken SUBSCREEN survey. Two groups identified:
- Unsuccessful sailors
  - Disqualified and separated for substance abuse, misconduct, and/or psych. dysfunction
  - Avg. LOS 14 months (none reenlisted)
  - Avg. Rank E2 (none above E4)
- Successful sailors
  - LOS ranged from 4.25 to 22 years
  - All reenlisted
  - E4 to E9 (avg. rank E5)

SMART Attrition Predictor Scales

- SMART uses the SUBSCREEN test data for attrition prediction
  - Different set of original SUBSCREEN scales
  - Identifies those 5 or 6 sailors flagged that later attrite before completion of their 1st enlistment
  - Evaluates the remaining sailors for their likelihood to attrite
- Problems Submerging
- Nervous, Anxious
- Mistake Joining Submarine Force
- Social Dependency
- Impulsivity
- Problems At Home Or School
- Coercive Attitudes
- Suicidal Ideation
- Unconditional Devotion To Service

SMART prediction capability for Enlisted Attrition



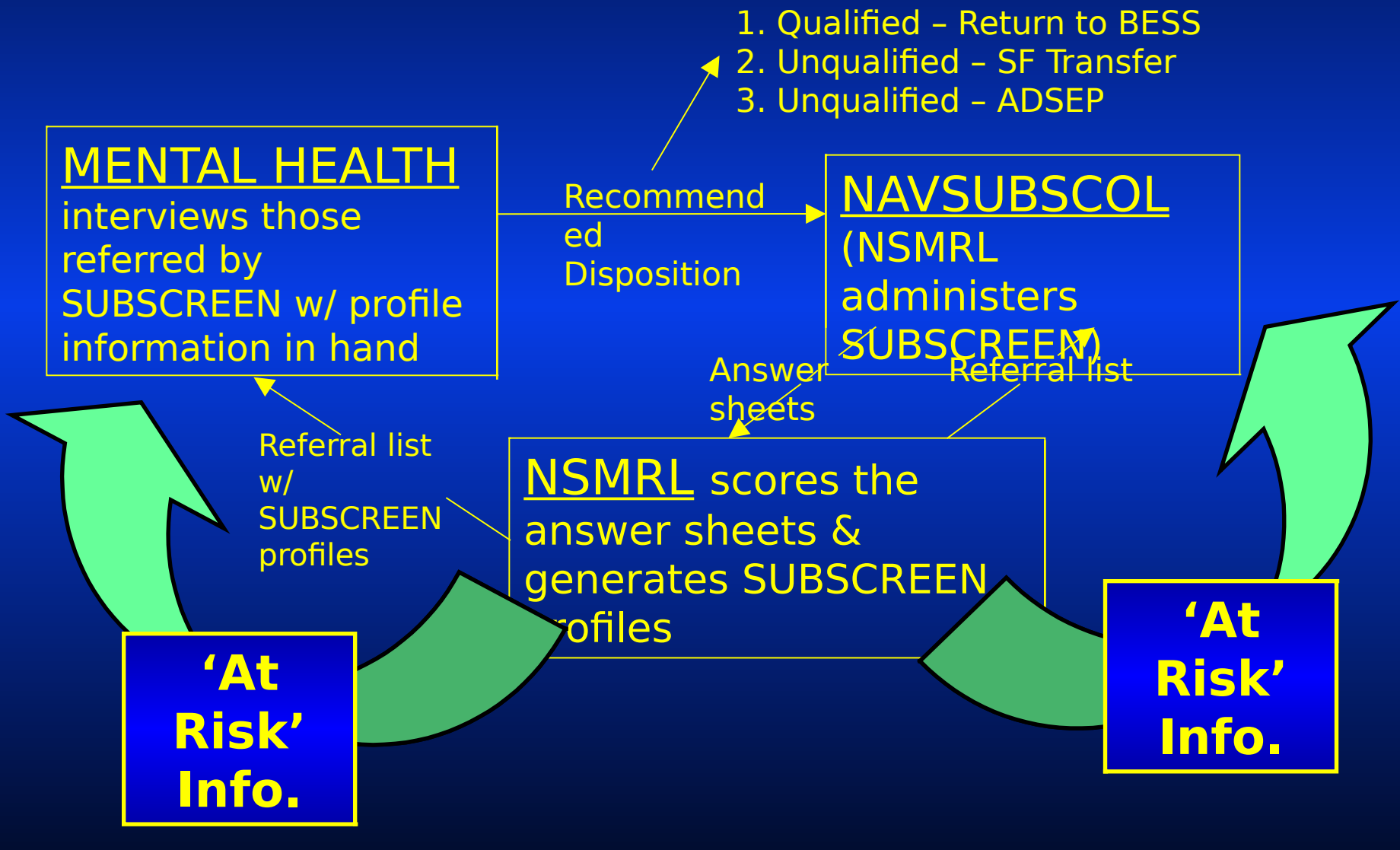
Attrition
Reenlisted
Attrited

Bars show counts – numbers of sailors in database

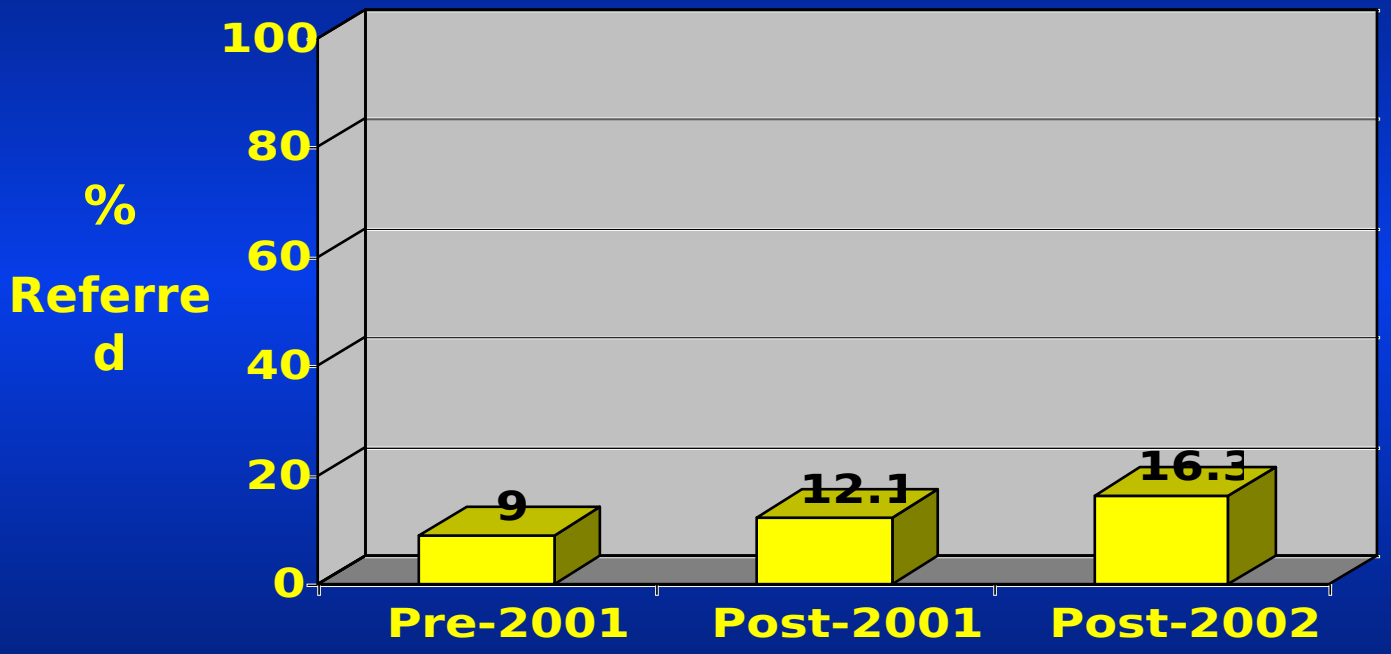
Results shown validated via five replications with specific groups.

Outcome: SMART accurately predicts career success & career attrition rates for enlisted non-nuclear submariners

Improvement of SUBSCREEN Process


1. Qualified – Return to BESS
2. Unqualified – SF Transfer
3. Unqualified – ADSEP
MENTAL HEALTH interviews those referred by SUBSCREEN w/ profile information in hand
Recommended Disposition
NAVSUBSCOL (NSMRL administers SUBSCREEN)
Answer sheets
Referral list
Referral list w/ SUBSCREEN profiles
NSMRL scores the answer sheets & generates SUBSCREEN profiles
'At Risk' Info.
'At Risk' Info.

Changes in SUBSCREEN Referral Rates Across Time from (1) Quality Control & (2) Partial Implementation of SMART (NACC)



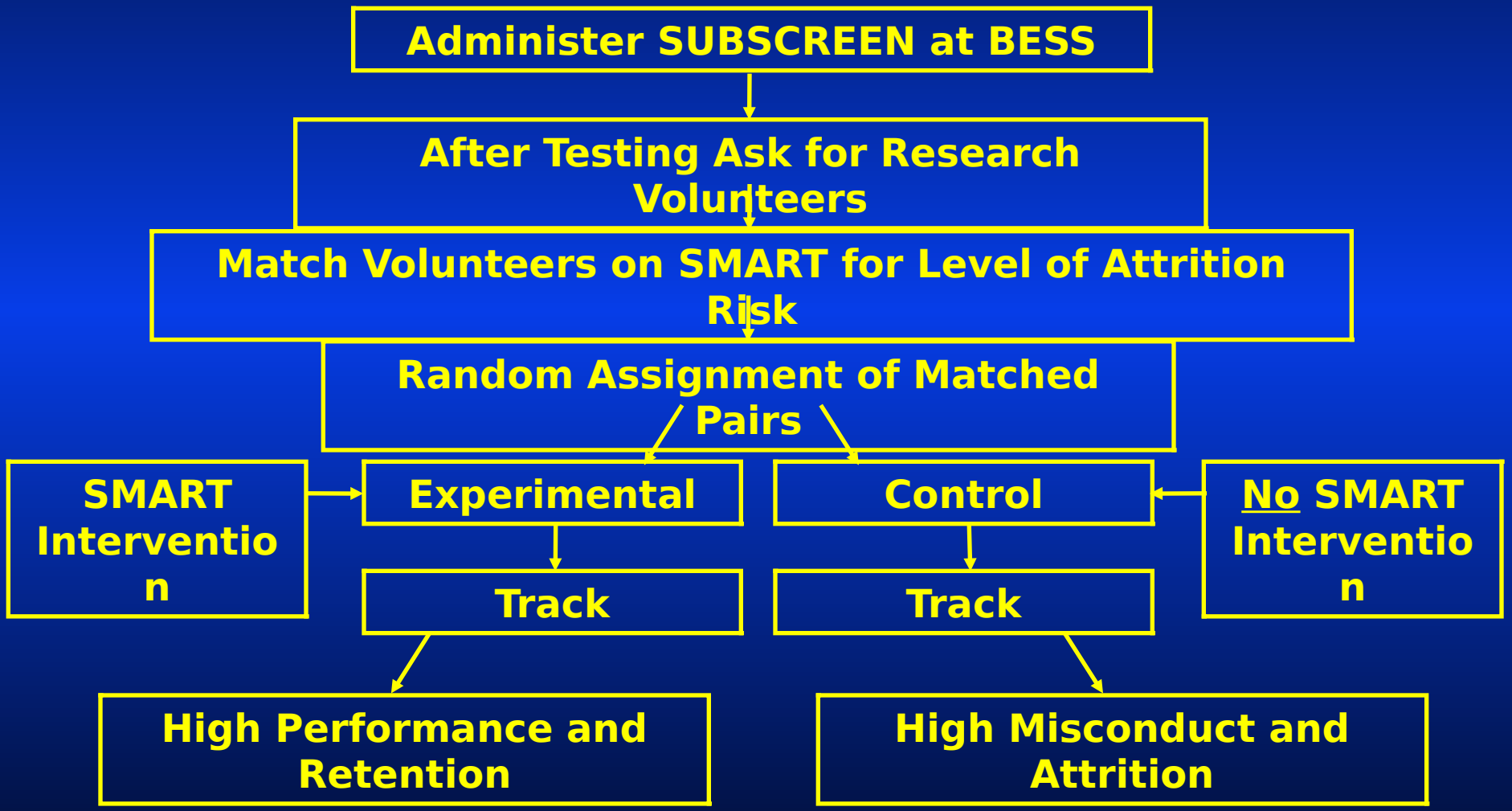
Summer and Fall of 2001
1. Increased quality of test scoring code
2. Improved referral on basis of Suicidal Ideation

Fall of 2002
1. Obtained buy-in on SMART implementation
2. Used SMART as additional referral reason

SUBFOR ROI

- Schoolhouse
  - Early referrals for psychological interview
    - Avoids future behavior problems by generating referral
    - Removal from pipeline early in process of totally unsuitable
      - SMART allows for finer tuning
  - Targeted interventions (assuming trends continue)
    - Lowers schoolhouse attrition and punishment rate
- Fleet
  - Fewer negative issues shipboard
  - Fewer medical evacuations
  - Lower attrition
- Financial Benefit: Cost of 1st term attritions
  - 18.5% x 36% x $200K x 2,500 = 33.3 Million Dollars
  - Assume SMART reduces attrition by 1/10th
  - 18.5% x 32.4% x $200K x 2,500 = 29.97 Million Dollars
  - 33.3 Million - 29.97 Million = $3.33 Million in Annual Savings

SMART T&E (BUMED 6.4 Project)



SMART T&E: Preliminary Results

- No differences in classroom results
- NJP data from NAVSUBSCOL:
  - 2041 BESS students, 84 (4.1%) received NJP
  - 8 of the 132 Controls (6.1%) received NJP
  - 4 of the 141 Experimental Group (2.8%) received NJP

SUBFOR ROI Prediction based decisions

Current use of SUBSCREEN & SMART saves dollars and labor:

Program	Predicts	Who	ROI	Status	Program User
SUBSCREEN	Submarine Qualification & career continuation	BESS/ SOBC	Reduces BESS throughput by ≅ 3% ~ $2 Million Annually	In Use by Fleet now	SUBSCOL/ NACC
SMART (**S**ub**M**arine **A**ttrition **R**isk **T**est - a subset of SUBSCREEN)	Enlisted Fleet Attrition for negative causes early in Sub service career	BESS	$3.3 Million Annually	In Use by Fleet now (ongoing intervention research)	SUBSCOL/ NACC

Outcomes: Current Savings ~ $5M/yr for annual Implementation/carrying Cost of about $1/4M

Prediction of Junior Officer Success

using

SUBSCREEN's Submarine Officer Retention Test (SORT)

CNO-N779

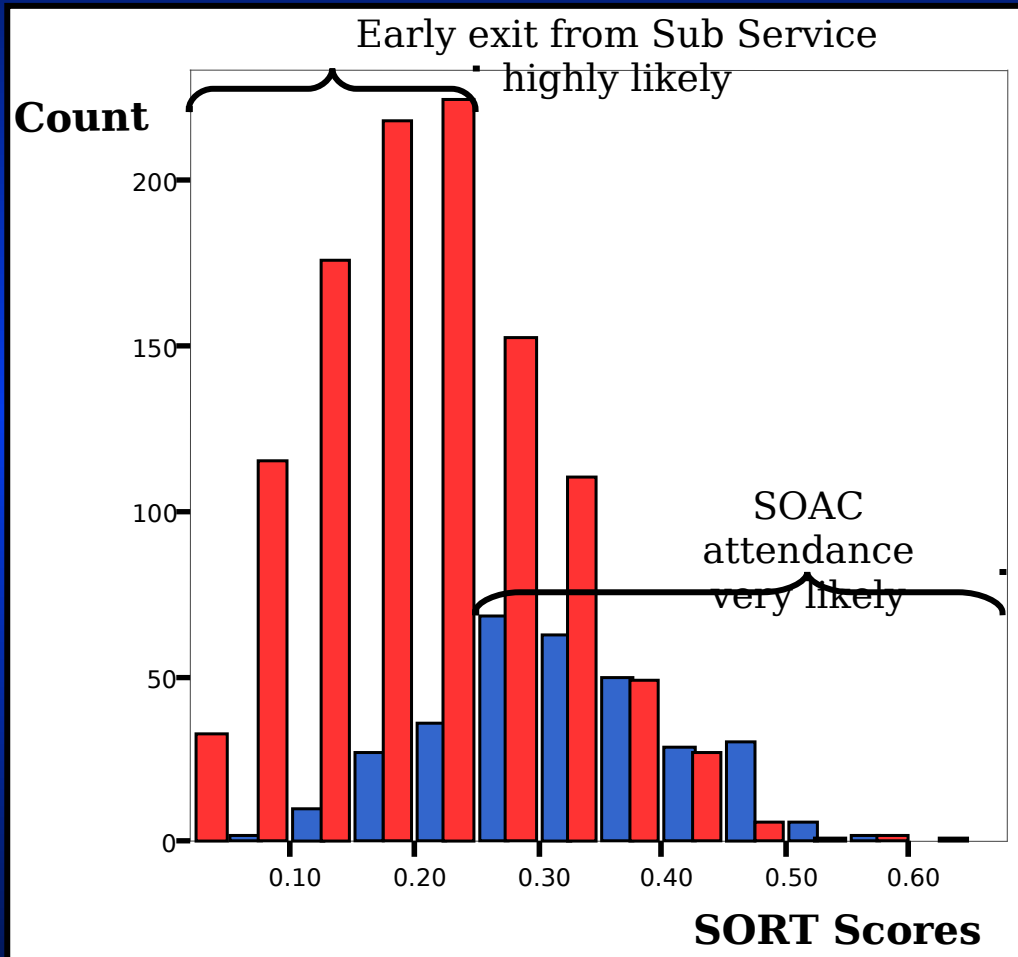
Predicting Officer Retention

- SUBSCREEN data analyzed
  - More than one thousand Submarine officers who had taken SUBSCREEN Survey at SOBC
  - Data from 1993 to 1999 surveys
  - Similar process to SMART development
- Career progression analysis showed:
  - ~ 25% attended SOAC
  - ~ 75% departed SUBFOR prior to SOAC
- Re-weighting SUBSCREEN scales created the Submarine Officer Retention Test (SORT)

SORT Predictor Scales

- The Submarine Officer Retention Test (SORT) is composed of temporally stable attitudes measured by SUBSCREEN.
- SOBC students scoring high on the following items were ***less*** likely to advance to SOAC:
  - **Problems with Nuclear Power & Weapons**
  - **Problems Submerging**
  - **Mistake Joining Submarine Service**
  - **Uncertain about Submarine Service**
  - **Problems with Submarine School**
  - **Extreme Scores (Detects Faking and Severe Problems)**
- SOBC students scoring high on the following item were ***more*** likely to advance to SOAC:
  - **Unconditional Devotion to Submarine Force**

Predicting officer career choice – SORT Results



Outcome: SORT accurately predicts, as of SOBC, an officer's likelihood to continue submarine service through SOAC.

Future Directions

- If SMART T&E is successful, release of SMART to SUBSCOL will be SOP for all BESS students
- Evaluate applicability of SMART to wider population
  - BETA test at RTC
- Evaluate applicability of SORT to Surface Warfare Officers

QUESTIONS?